

CLAIMS

1. A user input system, comprising:
 - means (55) for generating an alternating magnetic field;
 - 5 a user-holdable device (9) comprising a resonant circuit (34), means for coupling to ground, and a conducting tip (36), the means for coupling to ground being coupled to a first side of the resonant circuit (34) and the conducting tip (36) being coupled to a second side of the resonant circuit (34), the resonant circuit (34) being operable to provide an alternating voltage
 - 10 induced from the alternating magnetic field when positioned in the vicinity of the means (55) for generating an alternating magnetic field; and
 - means for sensing an output provided at the conducting tip (36) due to the alternating voltage source when the conducting tip (36) is in the vicinity of the means for sensing an output.
- 15 2. A system according to claim 1, wherein the means for sensing an output provided by the conducting tip (36) comprises means for determining the strength of the output as sensed at plural locations and means for comparing the plural sensed output strengths to determine a position of the
- 20 conducting tip (36) relative to the plural locations.
- 25 3. A system according to claim 1 or 2, wherein the sensing means comprises a resistive sheet (40) and current measuring means (42) arranged to measure a capacitive current flowing from the conducting tip (36) to the resistive sheet (40).
4. A system according to claim 1 or 2, wherein the sensing means comprises an electric field sensing reception electrode (47) and current sensing circuitry for determining a current excited in the electric field sensing
- 30 reception electrode (47) by an electric field (155, 156) generated by the conducting tip (36).

5. A system according to claim 4, wherein the sensing means is arranged to substantially filter out currents produced in the electric field sensing reception electrode (47) by electric fields generated by the means (55) for generating an alternating magnetic field.

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6. A system according to claim 5, wherein the filtering out is performed using a difference in phase between the electric field generated by the means (55) for generating an alternating magnetic field and the electric field (155, 156) generated by the conducting tip (36).

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7. A system according to any of claims 1 to 6, wherein shielding (180) is provided to substantially block any electric field generated by the means (55) for generating an alternating magnetic field and substantially allow to pass the magnetic field generated by the means (55) for generating an 15 alternating magnetic field.

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8. A system according to any of claims 4 to 7, arranged to determine the distance of the conducting tip (36) from the plane of the electric field reception electrode (47), compare the determined distance to a 20 predetermined threshold value, and if the determined value is less than or equal to the threshold then treat the conducting tip (36) position as input and if the determined value is greater than the threshold then not treat the conducting tip (36) position as input.

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9. A system according to any of claims 1 to 8, wherein the user-holdable device (9) is for use as a pen or stylus.

10. A system according to claim 9, wherein the conducting tip (36) is adapted to provide a writing feel to the user.

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11. A system according to any of claims 1 to 10, wherein the user-holdable device (9) comprises an external housing (28) by which the user is to

hold the user-holdable device (9), and wherein the means for coupling to ground is such that the coupling to ground is made via the user's hand (10) when the user is holding the user-holdable device (9).

5 12. A system according to claim 11, wherein the means for coupling to ground is further arranged to reduce shielding of the resonant circuit (34) from the magnetic field generated by the means (55) for generating an alternating magnetic field.

10 13. A system according to claim 11 or 12, wherein the means for coupling to ground comprises at least a portion (29) of the housing being coupled to the first side of the resonant circuit (34) and being sufficiently conducting for the coupling to ground via the user's hand (10).

15 14. A system according to claim 13, wherein the resonant circuit (34) is positioned in the user-holdable device (9) at a location away from the conducting portion (29) of the housing.

20 15. A system according to claim 12, wherein the user-holdable device (9) further comprises a coil (31) arranged to couple the resonant circuit (34) to the user's hand (10) whilst substantially allowing the magnetic field generated by the means (55) for generating an alternating magnetic field to reach the resonant circuit (34).

25 16. A system according to any of claims 1 to 15, further comprising means for sensing a user's finger (8).

30 17. A system according to claim 16, when dependent from claim 3, wherein the means for sensing the user's finger comprises the resistive sheet (40), the current measuring means (42), and means for distinguishing between sensing of the user's finger (8) and sensing of the user-holdable device (9).

18. A system according to claim 16, when dependent from claim 4, wherein the means for sensing a user's finger comprises an electric field sensing transmission electrode (102), the electric field sensing reception electrode (47), and circuitry (48) for sensing changes caused by the user's finger to a current excited in the electric field sensing reception electrode (47) by an electric field generated by the electric field sensing transmission electrode.

19. A system according to any of claims 1 to 18, further comprising one or more further user-holdable devices, respective user-holdable devices having different tuned frequencies.

20. A display device comprising a user input system according to any of claims 1 to 19.

15 21. A display device according to claim 20, wherein the sensing means is arranged to sense the output provided by the conducting tip (36) in an area corresponding to a display area of the display device.

20 22. A display device according to claim 20 or 21, wherein the display device is an active matrix liquid crystal display device.

25 23. A display device according to any of claims 20 to 22, when the user input system is according to claim 3, or any of claims 9 to 19 when dependent from claim 3, wherein the resistive sheet (40) is provided by a common electrode of the display device.

24. A user-holdable device (9) for a user to provide input to a user input system, comprising:

30 a resonant circuit (34);
means for coupling to ground; and
a conducting tip (36);

the means for coupling to ground being coupled to a first side of the resonant circuit (34) and the conducting tip (36) being coupled to a second side of the resonant circuit (34), the resonant circuit (34) being operable to provide an alternating voltage induced from an alternating magnetic field.

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25. A device according to claim 24, for use as a pen or stylus.

26. A device according to claim 25, wherein the conducting tip (36) is adapted to provide a writing feel to the user.

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27. A device according to any of claims 24 to 26, comprising an external housing (28) by which the user is to hold the user-holdable device (9), and wherein the means for coupling to ground is such that the coupling to ground is made via the user's hand (10) when the user is holding the user-holdable device (9).

20 28. A device according to claim 27, wherein the means for coupling to ground is further arranged to reduce shielding of the resonant circuit (34) from the magnetic field generated by the means (55) for generating an alternating magnetic field.

25 29. A device according to claim 27 or 28, wherein the means for coupling to ground comprises at least a portion (29) of the housing being coupled to the first side of the resonant circuit (34) and being sufficiently conducting for the coupling to ground via the user's hand (10).

30 30. A device according to claim 29, wherein the resonant circuit (34) is positioned in the user-holdable device (9) at a location away from the conducting portion (29) of the housing.

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31. A device according to claim 28, wherein the user-holdable device (9) further comprises a coil (31) arranged to couple the resonant circuit (34) to

the user's hand (10) whilst substantially allowing magnetic fields to reach the resonant circuit (34).

5 32. A set of user-holdable devices, comprising a plurality of user-holdable devices according to any of claims 24 to 31, wherein each user-holdable device has a different tuned frequency.

10 33. A method of sensing user input from a user-held device (9), comprising:

generating an alternating magnetic field that passes in to the user-held object (9);

inducing an alternating voltage in the user-held object (9) from the alternating magnetic field;

15 providing an output from the alternating voltage at a conducting tip (36) of the user-held device (9); and

using sensing means to sense the output when the user-held device (9) is positioned or moved such that the conducting tip (36) is in the vicinity of the sensing means.

20 34. A method according to claim 33, wherein the sensing means comprises a resistive sheet (40) and current measuring means (42); and sensing the output comprises using the current measuring means (42) to measure a capacitive current flowing from the conducting tip (36) to the resistive sheet (40).

30 35. A method according to claim 33, wherein the sensing means comprises an electric field sensing reception electrode (47) and current sensing means (48); and sensing the output comprises using the current sensing means (48) to determine a current excited in the electric field sensing reception electrode (47) by an electric field (155, 156) generated by the conducting tip (36).